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Docket No. 24301 11-13-02

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the patent application of Tomka et al.

Serial No. **09/606,219**

Filing date: June 29, 2000

Title: A method for manufacturing a shape body containing a starch, a homogenised mass containing starch and a device for manufacturing a soft capsule

Group Art Unit **1772** -- Examiner **Nordmeyer**

Commissioner for Patents
Washington, D.C. 20231

DECLARATION OF RICO MENARD (37 C.F.R. 1.132)

I, Rico Ménard, declare that:

1. I am a Physicist (Eidg. Dipl. Phys. ETH). I am co-inventor of the Patent Application No. 09/606,219 (the '219 application").

2. The '219 application concerns a technical improvement in the production of shaped bodies, in particular soft capsules. The improvement is aimed at substituting the commonly used gelatine as material for forming shaped bodies.

3. Soft capsules, also referred to in the '219-application as one-part capsules, are generally manufactured by a one-step method such as the rotary die process. Thus, the manufacturing of the capsule casing as well as the filling thereof is carried out in one single step. Due to this manufacturing process a material has to fulfill several requirements in order to be suitable as a material for a soft

capsule. As already pointed out in the '219-application, p. 2, last para, to p. 3, first para, these requirements are, inter alia,

i) the capability of forming highly elastic "endless" tapes with sufficient strength

ii) the capability of being rapidly dissolved under conditions occurring in the human stomach and/or intestinal tract

iii) the capability of being weldable

iv) the capability of forming stable seams by penetration of the molecules of the material into each other

v) easy avaliability and low costs

vi) the admissibility of said material from regulatory standpoints for introduction into human beings.

4. Gelatine has been the material of choice for the formation of soft capsules since it meets the above criteria almost ideally. However, gelatine is obtained from animal materials. In particular in view of the BSE problem there has been a need to replace gelatine by other materials which are not obtained from animals such as cows. From a viewpoint of availability and costs, starch is an attractive material for soft capsules. However, as outlined in the '219-application, p. 3, 3rd para, to p. 5, 2nd para, efforts in this direction have until now not been successful.

5. The '219-application provides, for the first time, a starch-containing mass which is suitable as a material for forming shaped bodies such as soft capsules. It has surprisingly been found that a homogenized mass containing starch, in particular starch with an amylopectin content of at least 50 % by weight, water and an organic softener and having a limiting viscosity index of at least 40 ml/g, can be formed into shaped bodies, in particular soft capsules, using a one-step process such as the rotary die process. In the art, the term "homogeneous" is understood as a system comprising only one phase, independent from the number of components.

6. US 5,462,980 (Bastioli) was cited against the '219 application. However, it does not disclose a homogenized starch-containing mass as required by the

'219 application. The aim of Bastioli was to provide films or sheets having improved liquid- and gas-barrier and mechanical properties in comparison with films produced from conventional starches with high amylose contents (cf. Column 2, l. 14-17). This aim was achieved by a polymeric composition comprising a starchy material component comprising at least 78 % by weight of amylopectin, and a synthetic thermoplastic polymeric component and urea. Bastioli found that those polymeric compositions formed laminar structures formed by pluralities of laminar microphases of the synthetic polymer alternating with starchy phases. The reason for this laminar structure was thought to be due to the inability of amylopectin to form complexes with the polymeric component (cf. Column 2, l. 23-37). The improvement of the liquid- and gas-barrier properties is said to be due to said laminar structure (cf. Column 2, lines 38-41). In other words, Bastioli did purposively not provide homogenized masses, but rather a material having a laminar structure of at least two different components. The laminar structure of the polymeric materials provided by Bastioli is clearly shown in Figures 1, 3 to 5, and 8 to 11. These figures are scanning electron microscope photographies. The compositions shown in these figures are not homogenized masses.

7. As comparative examples, in Bastioli compositions are shown which contain less than 78% amylopectin in the starchy material. However, besides that Bastioli does not consider these comparative examples as suitable for solving the above problem, also these compositions are not homogenized masses. As stated in column 2, lines 53-57: " When films produced with the use of amylose starches or conventional starches are observed by SEM, on the other hand, they show a microstructure formed by microglobules constituted by an interpenetrated synthetic polymer and starch structure." Those compositions are shown in Figs. 2 and 7. It can be seen that no homogenized mass is obtained, but rather a separation of the starch and the synthetic polymeric component.

8. On the other hand, the compositions according to the '219 application are homogenized masses. This is shown in the SEM photography enclosed herewith. This photography shows a cross-section through a broken part of a

foil made from a composition according to the '219 application. It can be seen that the broken part consists of a homogeneous material. The white strips at the edges of the part are tears which were generated during breaking of the part due to tension. The black spots are microscopically small inclusions of air. The very few white spots are inevitable contaminations of the probe. Thus, the teaching of Bastioli does not anticipate the invention underlying the '219 application in that no homogenized masses are disclosed.

9. In addition, Bastioli uses according to claims 5 to 7 of the US-5,462,980 a synthetic polymeric material which is not approved for use at human beings. Furthermore, to the best of my knowledge the most if not all of these polymeric materials will not dissolve under conditions occurring in the human stomach and/or intestinal tract. Moreover, the limiting viscosity index will be influenced by the synthetic polymeric material which is included in Bastioli's compositions. It cannot be concluded that Bastioli's compositions inherently exhibit the limiting viscosity index of the compositions of the '219 application.

10. Bastioli does not disclose or suggest a material which can be used for the formation of soft capsules. Inhomogeneous materials are not reliably reproducible with respect to their properties, because the inhomogenity of the material cannot be exactly reproduced. For example, the release of a pharmaceutical compound from capsules made from Bastioli's composition would not be reliably controllable and depend upon the exact structure of the capsule forming material. This is not tolerable for applications at human beings. On the other hand, a homogeneous material can be reliably reproduced and, due to its homogenity, always has the same properties. Therefore, soft capsules made from the compositions of the '219 application provide reproducible and controllable properties.

11. Nakajiama (US-5,098,606) was also cited against the '219 application. However, Nakajiama is not related to shaped bodies such as soft capsules. Nakajiama does not disclose homogenized starch-containing masses. Incidentially, it is noted that Nakajima on column 3, l. 27-28, does not refer to glycerine monostearate but to POE glycerine monostearate which is

polyoxyethylene glycerine monostearate. This is not the lubricant referred to in claim 13 and 15 of the '219 application. Nakajiama has no relevance for the '219 application.

12. Wittwer (US-4,673,438) was also cited against the '219 application. However, Wittwer does also not disclose or suggest a homogenized starch-containing mass. This is not surprising since Wittwer does not deal with the manufacturing of soft capsules. Rather, Wittwer teaches the manufacturing of hard capsules by the injection molding process. In this process, there is no need for forming highly elastic "endless" tapes with sufficient strength, the capability of being weldable, or the capability of forming stable seams by penetration of the molecules of the material into each other.

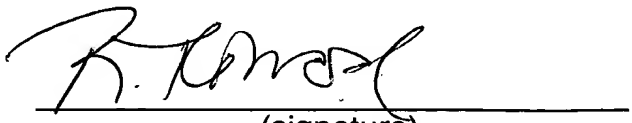
13. It has to be pointed out that in the '219 application a controlled process is carried out to obtain a homogenized mass having a limiting viscosity index of at least 40 ml/g. For example, during the process care has to be taken that the temperature does not exceed 160°C and should preferably be much lower, and that the kneading energy does not exceed 0.3 kWh/kg. This is particularly important since it is thought that the required properties of the capsule forming material are dependent on the maintenance of a sufficient molecular weight of the starch molecules (cf. p. 10, last para). If the working conditions are to harsh, then the starch molecules will become heavily broken, leading to a mass with properties which are unsatisfactory for the manufacture of stoft capsules.

14. Wittwer uses conditions of high temperature (up to 240°C) and high pressure (600 to 3000 $\cdot 10^5$ N/m^2). These conditions are not suitable for obtaining a homogenized mass having a limited viscosity index of at least 40 ml/g. Wittwer does nowhere teach to control the working conditions as described in the '219 application in order to obtain a material from which soft capsules can be made. As stated before, this is not what Wittwer is aiming for. All he wants to obtain is a material which can be injection-molded into hard capsules.

15. Bastioli (US-5,569,692) has also been cited against the '219 application. However, Bastioli does not teach a homogenized starch material. Bastioli teaches the use of a destructurized starch which can be mixed with a thermoplastic polymer in order to obtain biodegradable plastics materials. For that purpose a destructurizing agent such as urea is added. As explained by Bastioli, column 1, lines 25-37, a destructurized starch is a material the molecular structure of which has become disordered, i.e. the large starch molecules have been broken into several small molecules. As outlined above, this is in contradiction to the aims of the '219 application, which teaches the use of a starchy material which has only been smoothly degraded to an extent that the limiting viscosity of the material still exceeds 40 ml/g. Bastioli does not teach a homogenized starch material having such a high limiting viscosity. Actually, she does not even provide a mass comprising starch as the sole polymer material, but adds a thermoplastic polymer and a destructurizing molecule thereto. She even states in column 1, lines 57-58, that compositions of destructurized starch alone obtained in this way are not suitable for filming processes. Therefore, Bastioli does not teach or suggest the material of the '219 application, let alone the use thereof for forming soft capsules.

I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that the making of willful false statements or the like is punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patents issued thereon.

September 30, 2002



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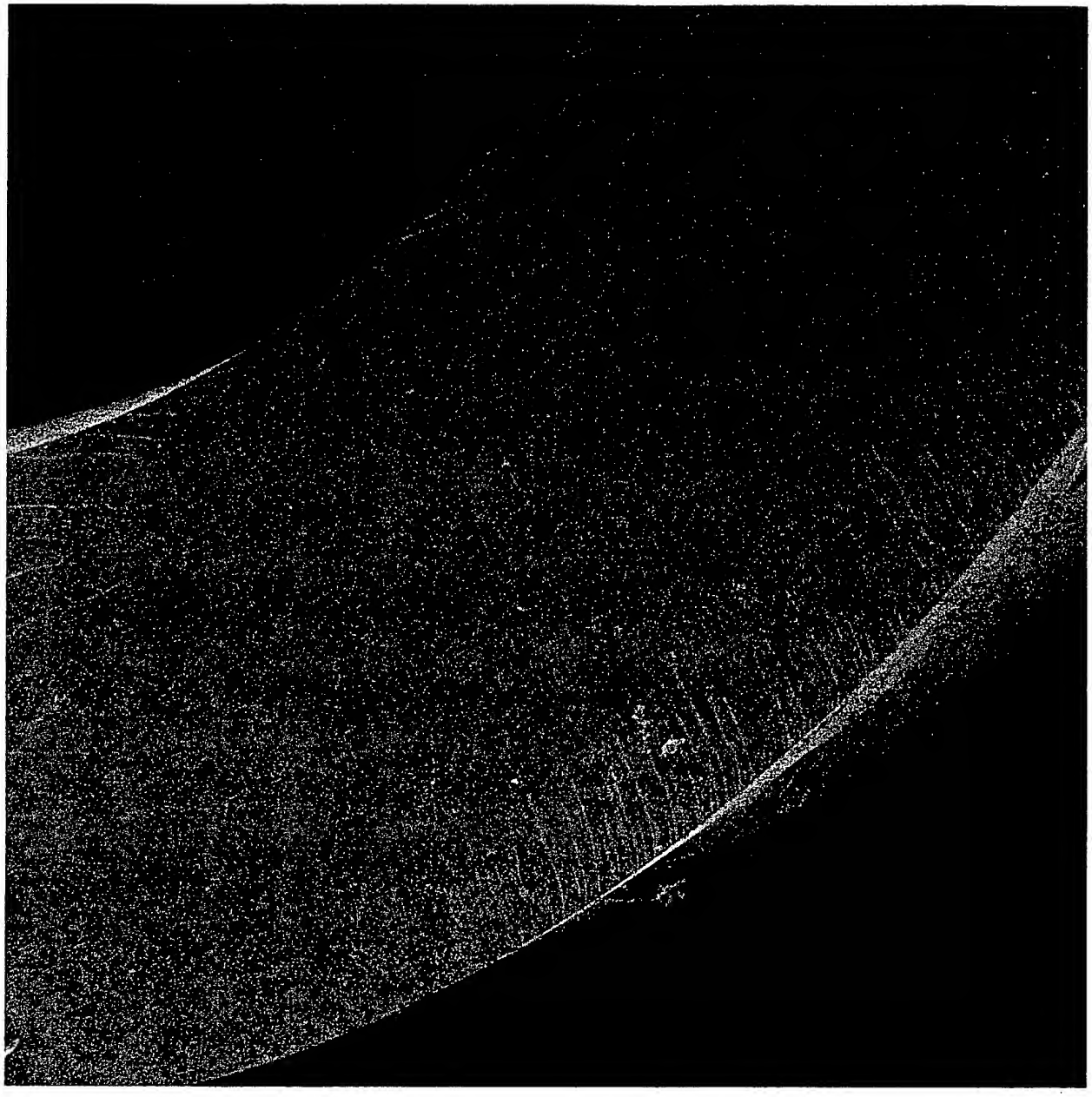

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